

# *Poisoning from Arsenic.*

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## *6. Poisoning from Arsenic.*

We noticed an interesting case of this kind in a former number, but without entering into any of the particulars. The subject of it was a woman, 32 years of age, and whose husband had of late given strong proofs of his desire to be separated from her. Returning one day from work, she found her husband and children had already dined, a portion, consisting of potatoes and beans, being left in the oven for her, and to this she sat down with an appetite, but owing to its very unpleasant taste, compared to high seasoning with pepper; she could not eat much of it. Resuming her work, she was in half an hour attacked with a sense of burning heat in the throat, and violent pains in her belly, quickly succeeded by urgent thirst, vomiting, and diarrhoea. The symptoms increased, and on the second day afterwards, medical assistance was called in by one of the neighbours, but the medicines administered were rejected by vomiting, and on the night of the fifth day the patient expired, having on the day preceding her death been interrogated and given the most collected answers to the officers of justice. It was ascertained that the husband had bought arsenic a short time previously; and two of the children, who had tasted of their mother's dinner, were attacked with symptoms similar to her's, but recovered. No part of the infected food could be procured, from the husband having carefully thrown it away. On dissection of the body of the woman, the stomach and intestines were found highly inflamed, and the mucous membrane of these viscera in several places detached and vacelated.

The contents of the stomach, consisting of five and a half ounces of yellowish red fluid, in the sediment of which nothing in the form of powder could be detected, either by the touch or the eye, assisted by a microscope, were first subjected to experiment. Being mixed with 24 ounces of distilled water, the whole was subjected to ebullition for an hour, and then strained, when twelve and a half ounces of fluid were obtained, which was made the subject, of the following trials: The colour of a piece of litmus paper was not in the least altered by it. An ounce of it mixed with 20 drops of a solution of ammoniated copper, assumed a yellowish green colour, and deposited a slight precipitate of a similar hue, which, when dried and burnt, omitted a slight but very perceptible arsenical smell (like garlic). Another ounce of it, mixed with half an ounce of a solution of sulphurated hydrogen, became clouded, and soon after deposited a small yellow sediment, which, treated as the preceding, emitted first a sulphurous, and then an arsenical smell. A third ounce being put in a glass vessel, and made to boil, had as much boiling lime water added to it, when the mixture became milky, and the sediment also in this case gave a smell of garlic when burnt. (Experiments like the three preceding were made with a weak solution of arsenic, two grains to an ounce of boiling distilled water, and afforded similar results, with this difference, that the precipitates were in larger quantities.) A large teaspoonful of the fluid being poured on a red hot plate of copper, after the evaporation of the water, emitted a distinct smell of garlic, and there remained on the copper small white spots surrounded with a black ring, and which spots could only be effaced with difficulty.

The contents of the small intestines weighing ninety-two drachms and consisting of a fluid similar to that found in the stomach, mixed with a larger quantity of mucus and a little yellowish excrement, had thirty-two ounces of distilled water mixed with them, were then exposed to ebullition for an hour and filtered. Owing



to the quantity of mucus it was only at the end of several days that six ounces of filtered liquid were obtained, and what remained on the filter having almost coagulated, no more could be extracted. That which was procured did not, in the slightest, redden litmus paper. A portion of it mixed with a solution of ammoniated copper, assumed a dark grass green colour, and deposited a bright green precipitate, which, dried and burnt, emitted the peculiar smell of arsenic. Another portion mixed with a solution of sulphuretted hydrogen, afforded a much larger sediment, than in the same experiment, with the fluid obtained from the stomach, and which sediment did not differ in the slightest from the colour of one of opium standing beside it, and it also gave the smell of garlic when burnt. A third portion of the fluid, made to boil and mixed with boiling lime water, produced a similar, but much more copious deposit than that obtained in the same trial with the first mentioned fluid. A tea spoonful of the fluid poured on a red hot plate of copper, gave the same results as in the former instance.

“ However convincing these proofs were of the presence of arsenic acid in the fluids submitted to experiment, and also of the large quantity of it in that, procured from the intestines, still in so important a matter we did not consider them sufficient, and we now proceeded to treat the œsophagus, stomach, and intestines, on the plan proposed by Valentine Rose, in order to detect any particles of arsenic that might be engrained in these parts, or enveloped in mucus, and to procure them in the solid form, or as metal. It may be previously remarked, that although it was now eight days since death, and four days since the parts in question had been removed from the body, and though they had not been kept in a cold room; still they did not emit the slightest putrid smell, they were as yet so firm and tough as to prevent their being easily cut with a common scalpel, a pair of strong scissors was required for this purpose. On the internal coat of the stomach and intestines something like a powder or crystals, could be perceived either by the touch or microscope. The weight of the whole was forty-four ounces, they were put into the vessel, previously used to boil their contents, along with three pounds of distilled water, and six drachms of caustic potass, and the whole boiled for an hour, when the decoction was separated from the solid parts, by means of a hair-sieve. To procure every thing that was soluble, the solid parts were again boiled in a pound of distilled water, and the decoction strained was added to that already obtained. On cooling the decoction, it assumed a dirty, ropy appearance, and several pieces of fat had formed on its surface, which were removed. It was put on a gentle fire and brought to boil, and nitric acid being gradually added to it, to saturate the potass, the fluid assumed a clear yellow colour. A considerable quantity of fatty and mucous matter dissolved by the potass was separated and removed by the filter, a few ounces of distilled water being poured over it to wash it. It must here be remarked, that when the potass was added, there was merely a soapy smell, but when the nitric acid was poured on, a very disagreeable arsenical smell was emitted. It was now again put on a gentle fire and neutralised with carbonate of potass, but so as to leave the acid slightly predominate, the fluid slightly reddening bitrum paper; for this purpose fourteen drachms of the salt were required. The decoction had now assumed a darker colour, and after some more mucus was separated by filtration, it weighed about fourteen ounces. It was again brought to boil, and mixed with twenty-eight ounces of briskly prepared boiling hot lime water in a glass cylinder. The mixture became instantaneously muddy, and a whiteish grey deposit subsided. The cylinder being allowed to remain untouched for a night, in the morning the transparent fluid was poured off, and the sediment being collected on a paper filter, was washed with distilled water and dried. The precipitate when dried, had an ash grey colour, and weighed forty grains; as much pure boracic acid, and ten grains of pure carbon being added to it, they were carefully triturated together, and the whole, weighing ninety grains, were put into a small thin glass retort, provided with a good lute, and exposed to an open charcoal fire till the retort became red hot. When cool,

the retort was carefully removed from the furnace, and the lute being removed, it was broken. In the bottom of it was a black loose charcoal mass, consisting of boracic acid and carbon, weighing sixty grains. In the neck of the retort, there was deposited a real regulus of arsenic in the form of a whitish grey, somewhat granular metallic sublimate. A piece of white paper firmly rubbed on this sublimate had a dark grey spot formed on it, which, smoothed with a polishing iron, assumed a distinctly metallic polish; and on being burnt, gave a strong arsenical smell. Part of the sublimate boiled in a sufficient quantity of distilled water and filtered, (whereby some undissolved greyish particles remained on the filter) assumed, on the addition of a solution of ammoniuriated copper, a yellowish green colour, and immediately deposited a beautiful yellowish green precipitate, (Sheeles green). On breaking the retort, the small pieces of glass on which was some of the sublimate were collected together, and a piece of smooth paper wrapped in it and burnt at the candle, when a strong or arsenical smell was produced, as to oblige us to open the doors and windows.

The quantity of metallic arsenic contained in the sublimate may be thus reckoned. During the sublimation an empyreumatic fluid collected in the receiver, which did not redden bitrum paper, nor did not alter the solution of ammuriated copper, and consequently appeared to consist merely of water, which had been united with the powder, at a low temperature. The weight of this fluid was twenty-five grains, and this added to sixty grains of residuum in the retort, makes eighty-five grains. Further, allowing that two grains of the in other respects fire-proof boracic acid, might be mechanically covered up with the moisture, we have remaining at least three grains of metallic arsenic in the sublimate. Seeing that Proust and Rose's manifold and repeated experiments coincide in establishing that in 100 parts of metallic arsenic there are 333 of arsenic acid, (white arsenic,) it follows that three grains of metallic arsenic are four of white arsenic; and it may be with certainty affirmed that these four grains of arsenic acid, actually were present in the viscera examined by us, and were separated by us in the metallic form. Of what remained of these three grains of metallic arsenic after our experiments, are deposited along with the broken pieces of the retort, in the sealed box, attached to this process verbal.





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Willudovius. M. D.

Cases  
of poisoning  
by  
sulphuric acid.



VI. *Cases of Poisoning by Sulphuric Acid*\*.—*First Case.* In May, 1819, Dr. Willudovius was called on to inspect juridically the body of a woman who had died under suspicious circumstances. She had long been in a dejected state; and on the day of her death, being missed from the house, was after long search found in an out-building. She was in a posture indicating spasm; concealed her sufferings; but at length confessed that she had pain in the abdomen. With some difficulty she was put to bed. Her limbs were cold, and countenance death pale. The case was treated by the Surgeon as colic, till the woman acknowledged that she had swallowed a large quantity of sulphuric acid. Milk was now with difficulty poured into the stomach, the mouth smeared with almond-oil, and tincture of valerian and castor administered; but in vain. The woman died two hours after she had been missed from the house. She was of the middle size, and aged about thirty.—*Dissection*, on the following day.

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\* Journal der Practischen Heilkunde, September, 1819.

*Exterior.* Body without fœtor. Two scald-like streaks extending from the angles of the mouth towards the chin.—

*Cranium.* Integuments and membranes sound. Substance of brain firmer than natural, and cutting like coagulated albumen. Uery little fluid in the ventricles. Plexus cho-roides, and other blood-vessels, little distended. Internal surface of the cheeks, the gums, lips, and tongue, white; the epidermis shrivelled, and in some places abraded.—

*Thorax.* Lungs sound, excepting adhesion of the right. Brown colour of their external surface extending two lines into their substance, and then gradually changing into a bright cinnaber-red, which continued throughout. The brown exterior cutting like leather: interior naturally, and little loaded with blood. Pericardium healthy. Both ventricles of the heart quite empty; parietes of left unusually thin. The blood of the large thoracic vessels blackish and partly coagulated. The œsophagus, in its whole circumference and length, internally whitish; and the shrivelled epidermis but loosely connected with the subjacent muscles. Diaphragm brownish, very soft, and in some places much corroded.—*Abdomen.* Omentum nearly destroyed. The stomach of a dirty brown colour, tore on the slightest touch: contained fluid of a sourish and somewhat cadaverous smell, and brown colour, and mixed with white caseous matter, and blackish coagulated blood.

This fluid was passed through filtering paper, and then imparted a red colour to litmus paper. A solution of muriate of barytes dropped into another portion, produced a white precipitate, which was wholly soluble in pure nitric acid; and hence sulphate of barytes. To a third portion was added a solution of nitrate of lead; from this immediately resulted a white precipitate, again soluble in the supernatant liquid. Consequently, as demonstrating sulphate of lead, it confirmed the evidence of the first experiment; and clearly proved the presence of sulphuric acid in the contents of the stomach.

The coats of the organ itself were scarcely recognizable; in some places very thick, with coagulated blood extravasated between them; in others, dark brown much corroded, exhibiting, as it were, gangrenous spots; and their whole substance extremely soft and lacerable. The internal membrane of the small intestines shrivelled, and the valvulæ conniventes projecting one on the other, so as to close the whole canal. The mucous coat of the large intestine also white and wrinkled up, but otherwise unaltered. Pancreas sound. Liver externally discoloured; every where very firm and compact: its external surface cutting like leather to the



depth of some lines, and of a brown colour; internal structure bright red. Gall bladder, its membranes considerably thickened, containing a thin and almost colourless fluid\*, and bright yellow bile strongly adherent to the blood-vessels, which projected on its internal surface. Spleen firmer than natural, and resembling, on incision, the liver. The kidneys, except that they presented a leather-like surface, unaltered. Urinary bladder empty. The unimpregnated uterus very firm, and cut with difficulty.

The comments of the author on the preceding facts, more diffuse than interesting, our limits will not allow us to retrace.

*Second Case.*—In August 1816, a calico printer, aged fifty-six, drank, by mistake for brandy, a considerable quantity of concentrated sulphuric acid. Every effort to relieve him was unavailing. He sunk exhausted, two months afterwards. The following were the results of the dissection. October 4th.—*Exterior.* Body so emaciated, that the cellular membrane, in the intervals of the muscles, appeared quite empty, and the muscles themselves projected distinctly beneath the skin. The bones, with all their prominences, perfectly visible. The teeth firm; gums of a pale blue colour; tongue yellowish-white; nostrils dry, and widely dilated. The belly so sunk in, that its parietes seemed completely drawn together, and the navel to rest upon the spine. Anus closed. Livid specks observed on the inguinal region only. No trace of external injury.—*Abdomen.* Adipose substance completely absorbed. Omentum merely a delicate transparent membrane, interwoven with vessels. Liver uncommonly small, of a dark brown-red colour. Gall-bladder distended with bile. Spleen of a bright blue or lead colour. Transverse colon low down; and greatest portion of the small intestines deeper than usual in the pelvis. All the parts in the vicinity of the gall-bladder, the peritonæum, and muscles, of a dark-brown colour. No traces of inflammation. The stomach was so contracted as to measure but five inches long and three deep. Its membranes everywhere, but especially in the vicinity of the cardia and pylorus, considerably thickened; the orifice of the latter scarcely four lines wide, but its circumference thickened, and of cartilaginous hardness. On the villous coat of the organ, and near the pylorus, several small, red, firm, granulated spots, with elevated margins, which had the aspect of incipient carcinoma, and evidently

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\* The author supposes the bile to have been precipitated from the fluid upon the parietes of the gall-bladder.

indicated the operation of a corrosive fluid. In the pylorus itself, cardia, and great curvature of the stomach, similar spots; but those in the two latter situations smaller, and less red. One in the fundus of the organ, of a greenish-blue colour, and two inches in circumference, exhibiting several small vessels much gorged with blood. A bluish patch on the external surface corresponding to it. All the consequences of chronic inflammation. The duodenum in the same state as the stomach, but more strongly marked the nearer it approached that organ. The villous coat of the small intestines exhibiting very firm wrinkles, disposed in rows. Membranes of jejunum and inferior portion of ileum extenuated; their blood-vessels, as it were, injected, and villous coat much wrinkled. Large intestine displaying these changes in the slightest degree, and containing some bright-yellow excrement. Kidneys firm and small. Bladder empty and contracted. Gall-bladder affording a considerable quantity of dark-green thick bile.—*Thorax*. Lungs collapsed, marbled with red and blue. Pericardium very firm, and containing a quantity of fluid. Heart large; little blood in the ventricles, especially the left. Auricles empty. Œsophagus thickened, but without inflammation or corrosion.—*Cranium*. Clear lymph beneath the dura mater, diffused over the whole brain. The same, coagulated, beneath the tunica arachnoidea, and all the cerebral vessels much gorged. Small quantity of fluid in the lateral ventricles. Basis of brain natural.

## CHEMISTRY.

VII. On *Sebadilline*, a new (vegetable) *Alkali*\*.—Dr. Meissner has obtained from cevadilla, or Indian caustic barley, (*veratrum sabbadilla*), a new alkali, to which he has given the name of sebadillium (*sebadilline*). It is contained in the epidermis of the long blackish-coloured seed of the plant, and exists in the proportion of about half per cent, combined with an acid which bears a strong analogy to the malic.

This alkali is prepared by making, with moderately strong alcohol, a tincture of the seeds. On evaporation there remains a resinous matter, which is to be rubbed down with water. To this brown liquid, when filtered, sub-carbonate of potash is added, till there is no longer any precipitation. The precipitated matter is then washed in water till the fluid passes colourless, and is afterwards dried.

This substance is of a (somewhat dead) white colour,

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\* Journal de Pharmacie, Mai 1820.



inodorous, and has a very pungent taste. Introduced into the nostrils, it acts as a violent sternutory. It restores the blue colour of reddened litmus paper. It is a little soluble in water, but perfectly so in alcohol.

Thus there are now at least seven new alkalis: morphine, strychnine, delphine, atropine, daphnine, daturine, and sebadilline. It is probable that the list will still increase till Chemists have recognised, in these apparently different substances, a common base.

#### BOTANY.

VIII. *New Febrifuge Plant*\*.—In the Madrid Gazette, under the date of June 25, 1819, is announced a new febrifuge plant, known to the Indians of Quito, by the name of *chinininka* (pronounced as *chinininga*). It is a shrub of a new genus. Dr. Joseph Pavon has named it *unanuea febrifuga*, and presented it to the Academy of Sciences of Madrid. Some experiments have already been made upon it in intermittent fever; and several well-known Physicians have obtained great success from giving a scruple of the root, in powder, every three hours. The dose is afterwards raised to half a dram; and by this mean, the febrile paroxysms, which had resisted even the cinchona, have been prevented.

W. T. Brande.

Table exhibiting the Average Quantity of Spirit in different kinds of Wine. By W. T. BRANDE, ESQ. Sec. R.S. &c.

SINCE the publication of the Researches upon the State of Spirit in Fermented Liquors, contained in the Philosophical Transactions for the years 1811 and 1813, I have, through the kindness of different friends, had ample opportunities of extending my experiments; and to my former list of wines, already copious, a few additions have been made, of which I have from time to time given notice, and which are put down in the following table. It does not seem necessary, in this place, to allude to the experimental details, nor to notice the precautions required in conducting the distillations, as they are fully given in the papers above noticed. I have therefore